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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/534,199
Filing Date: October 16, 2006
Appellant(s): ASPAR ET AL.

Jasper W. Dockery

For Appellant

EXAMINER'S ANSWER

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

This is in response to the appeal brief filed 12/27/10 appealing from the Office action mailed 8/4/10.

(3) Status of Claims

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

Venezia et al. "The role of implantation damage in the production of silicon-on-insulator films by co-implantation of He+ and H+" Proc. of Eighth Int'l Symposium on Silicon Materials Science and Technology, 1998.

Duo et al. "Comparison between the different implantation orders in H+ and He+ coimplantation" J. Phys. D: Appl. Phys. 34 (2001) pp 477-482

4,956,698 Wang 9-1990

JP11087668 Mitsubishi 3-1999

Bernard Terreault "Hydrogen blistering of silicon: Progress in fundamental understanding" Phys. Stat. Sol. (a) 204 No. 7, pp2129-2184 (2007)

Weldon et al. "Mechanism of silicon exfoliation induced by hydrogen/helium co-implantation" Applied Physics Letters vol. 73 number 25, pp 3721-3723.

Agarwal et al. "Efficient production of silicon-on-insulator films by co-implantation of He+ with H+" Applied Physics Letters volume 72 number 9 pp 1086-1088.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1, 2, 3, 5, 8-12, 14-18, and 21- 23 rejected under 35 U.S.C. 103(a) as obvious over Agarwal et al. "Efficient production of silicon-on-insulator films by co-implantation of He+ with H+" in view of Venezia et al. (The role of implantation damage in the production of silicon-on-insulator films by co-implantation of He⁺ and H⁺).

Regarding 1, 17, and 23 Agarwal et al. disclose a) implanting a first chemical species (H)($7.5 \times 10^{-15} \text{ cm}^{-2}$) in the substrate at a first depth (implanted at 30 kev) at least one b) implanting at least one second chemical species (He) ($1.0 \times 10^{-16} \text{ cm}^{-2}$) in the substrate at a second depth (implanted at 33 kev) different from said first depth and at an atomic concentration higher than the atomic concentration of the said first chemical species [2nd column p. 1086], wherein said at least one second chemical species is less effective than said first chemical species at weakening the substrate, and wherein said steps a) and b) can be executed in either order (inherent), c) diffusing at least a portion of said at least one second chemical species (p1087 second column disclose the helium diffusing) from said second depth into the weak buried region (annealing for 20 min at 450 deg C or 20 sec at 750 deg C), and d) initiating said fracture(shear and transfer) [abstract] along said first depth ((p. 1087 2nd column) discloses that the hydrogen immediately forms defects). Regarding claim 2, Agarwal disclose the first chemical species Hydrogen implanted at 30 kev with be at a greater depth that the helium

implanted at 33 kev (as disclosed in the examiner's note below). Regarding claims 5 and 10, Agarwal disclose furnace anneal (p.1086 2nd column). Regarding claims 8, 9, 21 and 22, Agarwal disclose annealing for 20 min at 450 deg C or 20 sec at 750 deg C (which is less than 300 degrees for several days as disclosed in [0075], further all of the helium is considered an "additional amount"). Regarding claims 11 and 12, Agarwal et al. disclose shear a transfer of the thin silicon film (the examiner understands this to mean a shear stress is applied to the wafer to separate the thin silicon layer). Regarding claim 14, Agarwal disclose a handle support (p. 1086 2nd column) applied to the substrate. Regarding claim 15, Agarwal et al. disclose the first species is hydrogen (title). Regarding claim 16, Agarwal et al. disclose second species is helium (He) (title). Regarding claim 18, Agarwal disclose support (handle) (p. 1086 2nd column) underlying the thin layer.

Agarwal fails to disclose the implantation of He at a different depth that resides outside of the weak buried region.

Venezia discloses implanting He at a much deeper depth using an energy of (130 keV) that resides outside of the weak buried region (inherent at that energy level).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Agarwal and Venezia because increasing the implantation depth is well known (Wang US Patent 4,956,698) and would separate the damage of the H and the He (Venezia p. 1387). In addition, the claim would have been obvious to one of ordinary skill in the art at the time the invention was made because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art, and "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If

this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.” KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385 (U.S. 2007). See also, Pfizer Inc. v. Apotex Inc., 82 USPQ2d 1852 (Fed. Cir. 2007).

Claims 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal et al. and Venezia as applied to claims 2 and 3 in view of Duo et al. (“Comparison between the different implantation orders in H+ and He+ coimplantation”).

Agarwal et al. and Venezia disclose the invention supra.

Agarwal and Venezia fail to disclose that second species implanted before the first species would result in exfoliation.

However, Duo et al. disclose that the synergistic effect of hydrogen and helium implantation is observed when combined in different orders (p 482, 2nd column).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Agarwal Venezia and Duo because the synergistic effect still exist regardless of the ion implantation order [Duo (p 482, 2nd column)].

Claims 6, 7, 13, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal et al. and Venezia as applied to claims 1 and 5 and further in view of Mitsubishi (JP 11087668).

Agarwal et al. and Venezia disclose the invention supra.

Agarwal and Venezia fail to disclose initiating said fracture further comprises applying a heat treatment, the diffusing and initiation occur simultaneously, and initiating said fracture, a

thickener is applied to the said substrate to serve as a support for said thin layer after said fracture of said thin layer from the said substrate (fig. 2).

However regarding claim 6, Mitsubishi disclose said initiating said fracture further comprises applying a heat treatment [0021]. Regarding claim 7 and 20, Mitsubishi disclose the diffusing and initiation occur simultaneously [0021]. Regarding claim 13, Mitsubishi disclose during initiating said fracture, a thickener is applied to the said substrate to serve as a support for said thin layer after said fracture of said thin layer from the said substrate (fig. 2).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Agarwal et al. Venezia and Mitsubishi because fracturing the film from the wafer would release the silicon film and enable one to bond the silicon film onto another wafer.

(10) Response to Argument

Applicant's arguments filed 12/27/10 have been fully considered but they are not persuasive.

The examiner would like to note that the appellant has misquoted Venezia on page 8 lines 8-10 of the appeal brief. The appellant quotes from Venezia pg. 1388 leading paragraph last sentence "it is simply the presence of the He gas in the H-rich region that leads to the formation of the surface blisters, and presumably makes the thin-film separation process more efficient." (italics appellant's emphasis) (underline examiner's emphasis). The examiner notes that the word "presumably" should be "thus". The examiner understands the word "thus" would eliminate uncertainty introduced by the word "presumably".

The appellant alleges "one skilled in the art would not understand Venezia et al. to recognize any benefit associated with disparate implantation energies" (appeal brief p 16 lines 2-3). In response to applicant's argument that Venezia does not recognize any benefit, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985) (MPEP 2145 section II). Furthermore, the examiner stated the reason (or benefit) for increasing the implantation depth "would separate the damage of the H and the He (Venezia p. 1387)" in the rejection filed 8/4/10.

In addition, the appellant asserts "that one skilled in the art would understand Venezia et al. to teach that the implantation of H and He at different depths is useless and thus not recommended." (appeal brief p17 lines 19-21). First, Venezia does not disclose the implantation of H and He at different depths is useless. In fact, Venezia disclose annealing the deeply implanted helium so that the helium migrates to the H-rich region and makes the separation process more efficient. As evidence, the examiner notes Venezia Fig 2 (below) and related text (below):

SIMS profiles of this sample before and after the 450°C anneal are shown in Fig. II, where the arrow indicates the depth of the H implant. The as-implanted SIMS depth profile shows that the He distribution is initially very broad and located deeper than the H profile. Upon annealing, the He is observed to be located in a narrow region near the depth of the H implant. Therefore, it is simply the presence of the He gas in the H-rich region that leads to the formation of surface blisters, and thus makes the thin-film separation process more efficient. (examiner's emphasis)(Venezia p.1388 leading paragraph last four sentences)

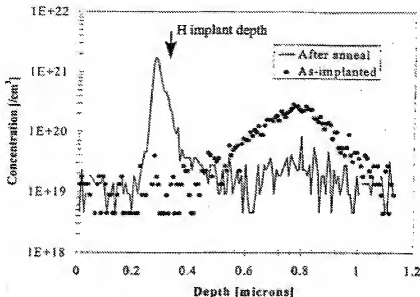


Figure 2. SIMS concentration profile vs depth for 30 keV 3×10^{16} H/cm² + 130 keV 1×10^{16} He/cm² annealed at 450°C / 15 min.

Second, the arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997) (“An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of obviousness.”) (MPEP 2145 section I).

Furthermore, the appellant alleges “Venezia et al. further concludes that blistering is more efficient when the He is implanted in the same region as the H. (Venezia et al., Pg. 1388, leading paragraph).” (appeal brief p17 lines 7-8). The examiner disagrees and the examiner cannot find the passage where Venezia discloses blistering is more efficient when carried out at

the same implant depth. Venezia, p.1388 leading paragraph last four sentences and figure 2, as noted above, discloses annealing the deeply implanted helium so that the helium migrates to the H-rich region and makes the separation process more efficient.

The appellant then alleges "Venezia et al. teaches away from implanting hydrogen and helium at different depths in the substrate" (appeal brief p17 lines 16-17). The examiner disagrees. Venezia, p.1388 leading paragraph last four sentences and figure 2, as noted above, discloses annealing the deeply implanted helium so that the helium migrates to the H-rich region and makes the separation process more efficient. To constitute a teaching away a reference must indicate that a particular feature should not or cannot be used for a particular purpose. *Paradance Mfg. Inc. v. SGS Importers Int'l Inc.*, 73 F.3d 1085, 1090 (Fed. Cir. 1995).

Furthermore, the appellant alleges "the appellant asserts that a prima facie a case of obviousness has not been established by the combination of cited references at least in view of the failure to establish why one skilled in the art would be motivated to combine the teachings of Venezia et al. with Agarwal et al. in view of the teaching away by Venezia et al." (appeal brief p18 lines 1-4). However, the examiner stated the reason for increasing the implantation depth "would separate the damage of the H and the He (Venezia p. 1387)" in the rejection filed 8/4/10.

Lastly, in response to appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Bradley K Smith/

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/Kimberly D Nguyen/

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T-QAS TC 2800